

REMARKS

The Examiner is thanked for the careful examination of the application. However, in view of the remarks that follow, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejection. Claim 15 has been amended to correct a minor error.

Claims 1-3, 5-7, 10, 11, 15, 16, 18 and 19:

Claims 1-3, 5-7, 10, 11, 15, 16, 18 and 19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,862,257, hereinafter *Sekine*, in view of U.S. Patent No. 5,486,927, hereinafter *Koizumi*.

Claim 1 defines an image processor which processes multi-level image data on density levels of pixels. The processor includes an edge judgment circuit which discriminates an edge direction of a target pixel from differences in density level between the target pixel and adjacent pixels thereof based upon the multi-level image data. The processor also includes a density level determining circuit which determines multi-level density levels and a plurality of sub-pixels in the target pixel. The density level of the sub-pixels is determined in accordance with the density level of the target pixel and the edge direction of the target pixel discriminated by the edge judgment circuit. In other words, the density level determining circuit uses both the density level of the target pixel as well as the edge direction of the target pixel when determining the multi-level density levels in the plurality of sub-pixels in the target pixel.

The Examiner alleges that *Sekine* discloses all of the elements of the independent claims 1, 15, 19 except that *Sekine* does not explicitly disclose determining multi-level density level in a plurality of sub-pixels in the target pixel. For the time being, Applicants do not challenge the Examiner's analysis of *Sekine*, but reserve the right to challenge such analysis at a later time, if necessary and appropriate.

The Examiner relies upon *Koizumi* to teach the determining multi-level density level in a plurality of sub-pixels in the target pixel. The Examiner alleges that *Koizumi* discloses a digital image forming apparatus using sub-divided pixels comprising a density level determining circuit that determines multi-level density levels in a plurality of sub-pixels in the target pixel.

However, as set forth above, the density level determining circuit of claim 1 relies not only upon the density level of the target pixel, but also upon the edge direction of the target pixel discriminated by the edge judgment circuit.

The Examiner does not allege that *Koizumi* determines multi-level density levels in a plurality of sub-pixels based, at least in part, upon an edge direction of a target pixel. In fact, a review of the portions of *Koizumi* identified by the Examiner reveals that the density levels of the sub-pixels is determined by the formulas set forth at the bottom of column 6, line 64, and by the formula set forth in column 11, line 12. Such formulas do not appear to take into account the edge direction of the target pixel which includes the sub-pixels.

Accordingly, none of the references, either *Sekine* or *Koizumi*, teaches or suggests determining density levels of a plurality of sub-pixels in a target pixel, wherein the determination is made in accordance with not only the density level of the target pixel, but also the edge direction of the target pixel.

Accordingly, claim 1 is not taught or suggested by the combination of references proposed by the Examiner.

Furthermore, Applicants challenge the motivation provided by the Examiner to make the proposed combination. The Examiner alleges that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify *Sekine* according to the teachings of *Koizumi* because it will allegedly minimize jaggedness in the image boundaries and will enhance sharpness of the image. However, Applicants question whether the teachings of *Sekine* could be properly modified by the teachings of *Koizumi*, and whether there is adequate motivation to do so. Applicants submit that the Examiner is merely relying upon hindsight in piecing together the teachings of two different prior art references in order to reach the present invention. Such hindsight consideration has been criticized by the Court of Appeals for the Federal Circuit and is generally regarded as an improper method of forming a rejection under 35 U.S.C. §103(a).

Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection of claim 1, and dependent claims 3,5-7, 10 and 11.

Claim 15 defines a method for processing multi-level image data and density levels of pixels where a pixel is divided into a plurality of sub-pixels. The method of claim 15 includes determining multi-level density levels in a plurality of sub-pixels in the target pixel in accordance with the density level of the target pixel and the discriminated edge direction of the target pixel. As set forth above with respect to the rejection of claim 1, the combination proposed by the Examiner does not teach or suggest the use of a discriminated edge direction in determining density levels of a plurality of sub-pixels in a target pixel. Accordingly, the rejection of claim 15 is also improper and should also be withdrawn.

Claims 16 and 18 depend from claim 15, and are thus also patentable over the proposed combination at least for the reasons as set forth above with respect to claim 15.

Claim 19 defines an image processor which includes, among other elements, a density level determining circuit which determines density levels in a plurality of sub-pixels in the target pixel, wherein the density levels are determined in accordance with the density level of the target pixel and the edge direction of the target pixel. Accordingly, claim 19 is also patentable over the prior art at least for the reasons set forth above with respect to claim 1.

Accordingly, the Examiner is also respectfully requested to reconsider and withdraw the rejection of claims 15, 16, 18 and 19.

Claims 4, 8, 9, 12-14, 17 and 20 have been rejected under 35 U.S.C. §103(a) as being unpatentable over *Sekine* in view of *Koizumi* and U.S. Patent No. 6,408,109, hereinafter *Silver*.

The Examiner relies upon *Silver* as allegedly disclosing an apparatus for detecting sub-pixel locations of edges in digital images comprising an edge direction detecting circuit that cancels the discriminated edge direction when the density level of a pixel adjacent to the target pixel in the edge direction is larger than a threshold value. However, claims 4, 8, 9, 12-14 and 17 depend from either claim 1 or claim 15. In addition, the teachings of *Silver* relied upon by the Examiner do not overcome the deficiency of the rejection set forth above with regard to claims 1 and 15. Accordingly, Applicants submit that claims 4, 8, 9, 12-14, and 17 are patentable over the proposed combination at least for the reasons set forth above with respect to claims 1 and 15.

Furthermore, Applicants reserve the right to challenge the Examiner's analysis of *Silver*, and the alleged motivation for combining the three references at a later time, if necessary and appropriate.

Claim 20 defines an image processor which includes, among other elements, a density level determining circuit which determines density levels in a plurality of sub-pixels in a target pixel, wherein the density levels of the sub-pixels are determined in accordance with both the density level of the target pixel, as well as the edge direction of the target pixel. As set forth above, none of the references relied upon by the Examiner teach or suggest the use of at least the edge direction of the target pixel for determining density levels of a plurality of sub-pixels in the target pixel. Accordingly, the rejection of claim 20 is also improper and should be withdrawn.

In the event that there are any questions concerning this response, or the application in general, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

Date: Aug. 12, 2003

By: William C. Rowland
William C. Rowland
Registration No. 30,888

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620